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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/842,769 | 04/27/2001 | Toshiya Hagihara | 1422-0472P | 2832 |
| 2292 | 7590 | 10/31/2003 | EXAMINER | |
| BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747 | | | UMEZ ERONINI, LYNETTE T | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1765 | |

DATE MAILED: 10/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 09/842,769 | HAGIHARA ET AL. | |
| | Examiner | Art Unit | |
| | Lynette T. Umez-Eronini | 1765 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 10/1/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s) _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____. | 6) <input type="checkbox"/> Other: _____. |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 14-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Kaufman ('489).

Kaufman teaches, ". . . a method for using the chemical polishing slurry to remove titanium . . . from a substrate" (Abstract). "The CMP slurry of this invention includes **an abrasive**. The abrasive is typically a metal oxide abrasive. The metal oxide abrasive may be selected from the group including **alumina**, titania, zirconia, germania, silica, ceria and mixtures thereof" (column 4, lines 46-50). "The metal oxide abrasive may be produced by any techniques known to those skilled in the art. Metal oxide abrasives can be produced using any high temperature process such as sol-gel, hydrothermal or, plasma process, or by processes for manufacturing fumed or precipitated metal oxides. Preferably, the metal oxide is a fumed or precipitated abrasive and, more preferably it is a fumed abrasive such as fumed silica or fumed alumina (which reads on applicant's intermediate alumina)" (column 4, lines 55-60).

Kaufman further teaches, "Preferably, the metal oxide abrasive is incorporated into the aqueous medium of the polishing slurry as a concentrated aqueous dispersion

of metal oxides, . . . The aqueous dispersion of metal oxides may be produced utilizing conventional techniques, such as slowly adding the metal oxide abrasive to an appropriate media, for example, deionized **water** . . .” (column 5, lines 63).

Kaufman also teaches, “The CMP slurry of this invention includes an organic acid. . . . “the CMP slurry of the present invention to enhance the selectivity to oxide polishing rate, such as **monofunctional acids, di-functional acids, hydroxyl/carboxylate acids**, chelating, non-chelating acids, and their salts. Preferably, the organic acid is selected from the group of **acetic acid** (same as applicant’s monocarboxylic acid having 1 to 20 carbon atoms), adipic acid, butyric acid, capric acid, caproic acid, caprylic acid, citric acid, **glutaric acid** (same as applicant’s polycarboxylic acid having 4 or more carbon atoms and having neither OH group(s) groups nor SH group(s)), glycolic acid, formic acid, fumaric acid (same as applicant’s polycarboxylic acid having 4 or more carbon atoms and having neither OH group(s) groups nor SH group(s)), lactic acid, lauric acid, malic acid, maleic acid (same as applicant’s polycarboxylic acid having 4 or more carbon atoms and having neither OH group(s) groups nor SH group(s)), malonic acid, myristic acid, **oxalic acid**, (same as applicant’s dicarboxylic acid having 2 to 3 carbon atoms), palmitic acid, phthalic acid, propionic acid, pyruvic acid, stearic acid, succinic acid, tartaric acid, valeric acid and derivatives, including **salts thereof**” (column 6, lines 1-14), which reads on applicant’s roll-off reducing agent. The above reads on,

A process for producing a substrate comprising a step of polishing a substrate to be polished with a polishing composition comprising:

(A) one or more compounds selected from the group consisting of carboxylic acids having 2 to 20 carbon atoms having either OH or group or groups or SH group or groups, monocarboxylic acids having 1 to 20 carbon atoms, and dicarboxylic acids having 2 to 3 carbon atoms, and salts thereof;

(B) one or more compounds selected from polycarboxylic acids having 4 or more carbon atoms and having either OH or group or groups or SH group or groups, monocarboxylic acids having 1 to 20 carbon atoms, and dicarboxylic acids having 2 to 3 carbon atoms, and salts thereof;

(C) one or more compounds selected from an intermediate alumina and an alumina sol;

an abrasive; and

water, **in claims 14.**

Kaufman further teaches, "the metal oxide abrasive may consist of discrete, individual metal oxide particles having a primary particle diameter less than 0.4 micron (400 nm) and a surface area ranging from about 10 m²/g to about 250 m²/g. . . ." (column 4, lines 50-54), which reads on,

wherein the intermediate alumina and the alumina sol in Compounds (C) have a specific surface area of from 30 to 300 m²/g and an average particle size of 0.01 to 5 μ m, **in claim 15** and which falls within applicant's range or both surface area and average particle size.

Kaufman also teaches, ". . . Due to stringent purity requirements in the IC industry the preferred metal oxide should be of a high purity. High purity means that

the total impurity content, from sources such as raw material impurities and trace processing contaminants, is typically less than 1% and preferably less than 0.01% (i.e., 100 ppm)" (column 5, lines 50-54), which reads on,

wherein the intermediate alumina is prepared from aluminum hydroxide and/or alumina sol each having a specific surface area of 10 m²/g or more and encompasses applicant's specific surface area. Since Kaufman's alumina is the same as that used in the polishing slurry and polishing method of the claimed invention, then preparing Kaufman's alumina in the same manner as the claimed invention would result in the intermediate alumina having a content of an alkali metal and a content of an alkaline earth metal of 0.1 % by weight or less, **as in claim 16**.

3. Claims 17-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Kaufman (489).

As pertaining to claims 17-19, Kaufman teaches, ". . . a method for using the chemical polishing slurry to remove titanium . . . from a substrate" (Abstract). "The CMP slurry of this invention includes **an abrasive**" (column 4, line 46). "Preferably, the metal oxide abrasive is incorporated into the aqueous medium of the polishing slurry as a concentrated aqueous dispersion of metal oxides, . . . The aqueous dispersion of metal oxides may be produced utilizing conventional techniques, such as slowly adding the metal oxide abrasive to an appropriate media, for example, deionized **water** . . ." (column 5, lines 63).

Kaufman also teaches, "The CMP slurry of this invention includes an organic acid. " . . . the CMP slurry of the present invention to enhance the selectivity to oxide polishing rate, such as **monofunctional acids, di-functional acids, hydroxyl/carboxylate acids**, chelating, non-chelating acids, and their salts. Preferably, the organic acid is selected from the group of **acetic acid** (same as applicants monocarboxylic acid having 1 to 20 carbon atoms), adipic acid, butyric acid, capric acid, caproic acid, caprylic acid, citric acid, **glutaric acid** (same as applicant's polycarboxylic acid having 4 or more carbon atoms and having neither OH group(s) groups nor SH group(s)), lactic acid, lauric acid, malic acid, maleic acid (same as applicant's polycarboxylic acid having 4 or more carbon atoms and having neither OH group(s) groups nor SH group(s)), malonic acid, myristic acid, **oxalic acid**, (same as applicant's dicarboxylic acid having 2 to 3 carbon atoms), palmitic acid, phthalic acid, propionic acid, pyruvic acid, stearic acid, succinic acid, tartaric acid, valeric acid and derivatives, including **salts thereof**" (column 6, lines 1-14), which reads on applicant's roll-off reducing agent). The aforementioned reads on,

A process for producing a substrate comprising a step of polishing a substrate to be polished with a polishing composition comprising:

A process for producing a substrate comprising a step of polishing a substrate to be polished with a polishing composition comprising:

(A) one or more compounds selected from the group consisting of carboxylic acids having 2 to 20 carbon atoms having either OH or group or groups or SH group

or groups, monocarboxylic acids having 1 to 20 carbon atoms, and dicarboxylic acids having 2 to 3 carbon atoms, and salts thereof;

(B) one or more compounds selected from polycarboxylic acids having 4 or more carbon atoms and having either OH or group or groups or SH group or groups, monocarboxylic acids having 1 to 20 carbon atoms, and dicarboxylic acids having 2 to 3 carbon atoms, and salts thereof;

an abrasive; and

water.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaufman (US 5,783,489) in view of Tsai (US 6,037,260).

Kaufman teaches, . . . a method for using the chemical polishing slurry to remove titanium . . . from a substrate" (Abstract). "The CMP slurry of this invention includes **an abrasive**. The abrasive is typically a metal oxide abrasive. The metal oxide abrasive may be selected from the group including **alumina**, titania, zirconia, germania, silica, ceria and mixtures thereof" (column 4, lines 46-50). "The metal oxide abrasive may be produced by any techniques known to those skilled in the art. Metal oxide abrasives can be produced using any high temperature process such as sol-gel, hydrothermal or, plasma process, or by processes for manufacturing fumed or precipitated metal oxides. Preferably, the metal oxide is a fumed or precipitated abrasive and, more preferably it is a fumed abrasive such as fumed silica or fumed alumina (which reads on applicant's intermediate alumina)" (column 4, lines 55-60).

Kaufman further teaches, "Preferably, the metal oxide abrasive is incorporated into the aqueous medium of the polishing slurry as a concentrated aqueous dispersion of metal oxides, . . . The aqueous dispersion of metal oxides may be produced utilizing conventional techniques, such as slowly adding the metal oxide abrasive to an appropriate media, for example, deionized **water** . . ." (column 5, lines 63).

Kaufman also teaches, "The CMP slurry of this invention includes an organic acid. . . . "the CMP slurry of the present invention to enhance the selectivity to oxide polishing rate, such as **monofunctional acids, di-functional acids, hydroxyl/carboxylate acids**, chelating, non-chelating acids, and their salts.

Preferably, the organic acid is selected from the group of **acetic acid** (same as applicants monocarboxylic acid having 1 to 20 carbon atoms), adipic acid, butyric acid, capric acid, caproic acid, caprylic acid, citric acid, glutaric acid, glycolic acid, formic acid, fumaric acid, lactic acid, lauric acid, malic acid, maleic acid, malonic acid, myristic acid, **oxalic acid**, (same as applicant's dicarboxylic acid having 2 to 3 carbon atoms), palmitic acid, phthalic acid, propionic acid, pyruvic acid, stearic acid, succinic acid, tartaric acid, valeric acid and derivatives, including **salts thereof**" (column 6, lines 1-14), which reads on applicant's roll-off reducing agent). The aforementioned reads on,

A process for producing a substrate comprising a step of polishing a substrate to be polished with a polishing composition comprising:

water;

an abrasive;

a roll-off reducing agent comprising one or more compounds selected from the group consisting of carboxylic acids having 2 to 20 carbon atoms having either OH or group or groups or SH group or groups, monocarboxylic acids having 1 to 20 carbon atoms, and dicarboxylic acids having 2 to 3 carbon atoms, and salts thereof.

Kaufman differs in failing to teach an intermediate alumina.

Tsai teaches, " . . . all of thee aluminum oxides that can be dispersed in an organic acid or inorganic acid can be used in the present invention, such as α phase aluminum oxide, θ phase aluminum oxide, δ phase aluminum oxide, γ phase aluminum

oxide, and mixtures thereof" (column 3, lines 7-11), which read on applicant's polishing composition comprising an intermediate alumina.

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to incorporate Tsai's θ phase aluminum oxide, δ phase aluminum oxide, or γ phase aluminum oxide, which are the same as applicant's intermediate alumina, into Kaufman's polishing composition for the purpose of stabilizing the suspension properties of the slurry by altering the rheology of the polishing slurry into that of a thixotropic substance (Tsai, column 3, lines 4-6).

Response to Arguments

7. Applicant's arguments with respect to claim 13-19 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703-305-2667. The fax phone numbers for the organization where this application or proceeding is assigned and for regular communications and 703-872-9306 for After Final communications.

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Lynette T. Uma-Eronini
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October 29, 2003